Decentralized Finance:
# A Primer on DeFi Lending

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The DeFi Stack
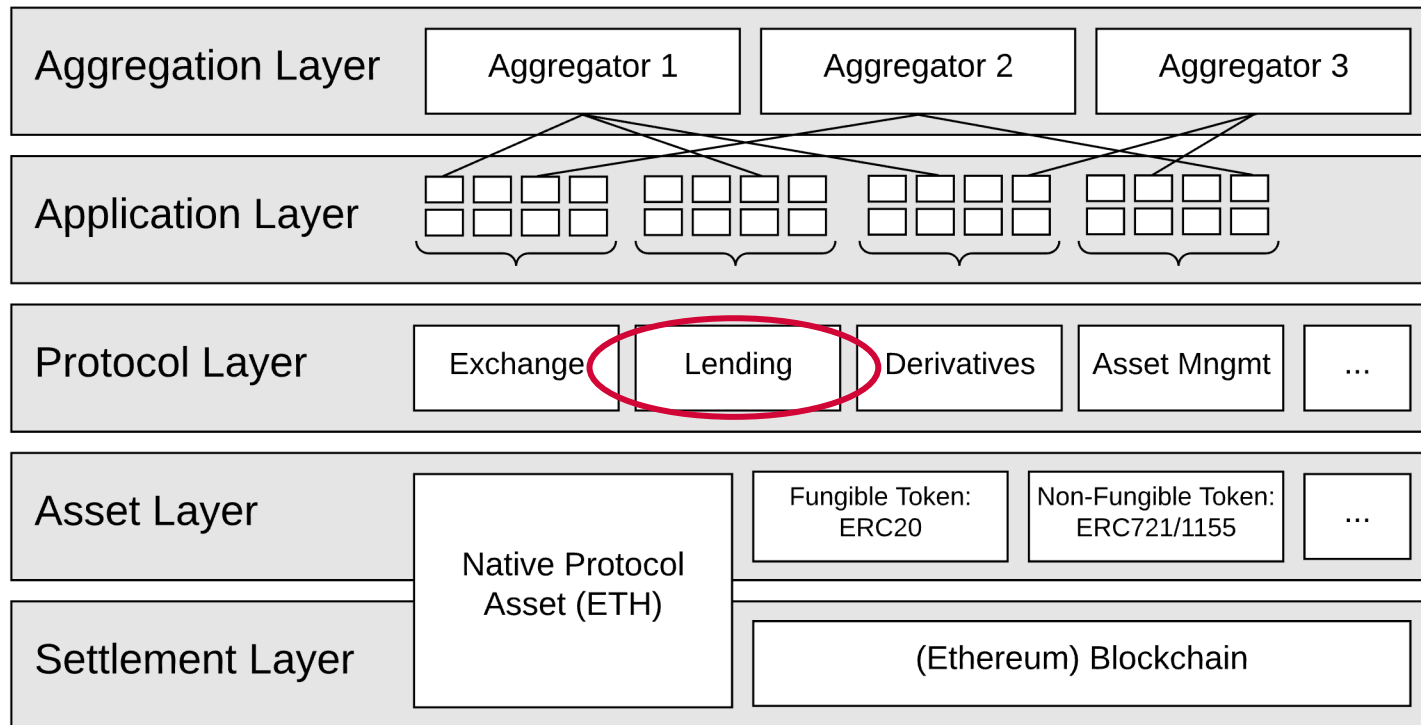
Schär (2021) Decentralized Finance: On Blockchain- and Smart Contract-based Financial Markets.

Different Kinds of DeFi Loans

|	Collateralized	Trusted CP?	Loan
On-chain collateralized stablecoin vaults (CDP)	yes	no	Newly minted stablecoins
Lending Pools (CDM)	yes	no	Already existing cryptoassets
Flash Loans	no	no	Existing or newly minted assets

On-Chain Collateralized Vaults (CDP)

On-Chain Collateralized Vaults

On-Chain Collateralized Stablecoins

Minium Collateralization Factor

USD

USD Debt

Collateral Value
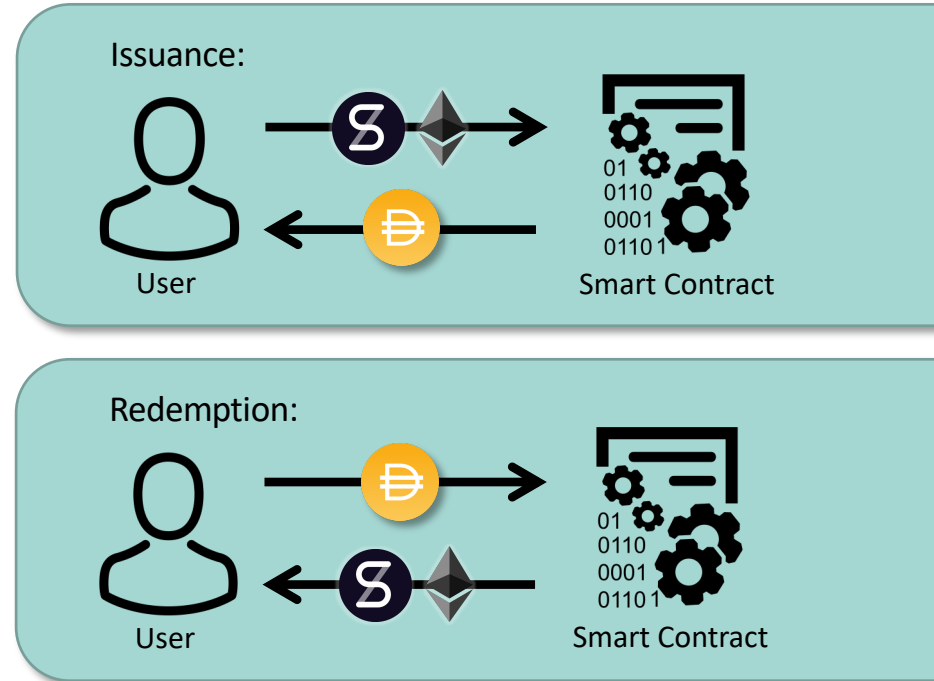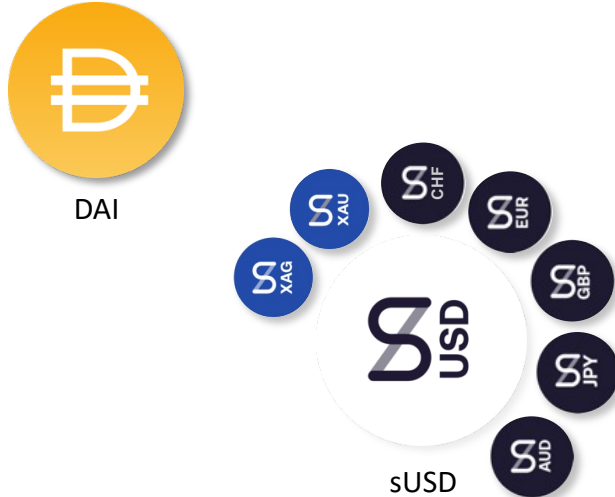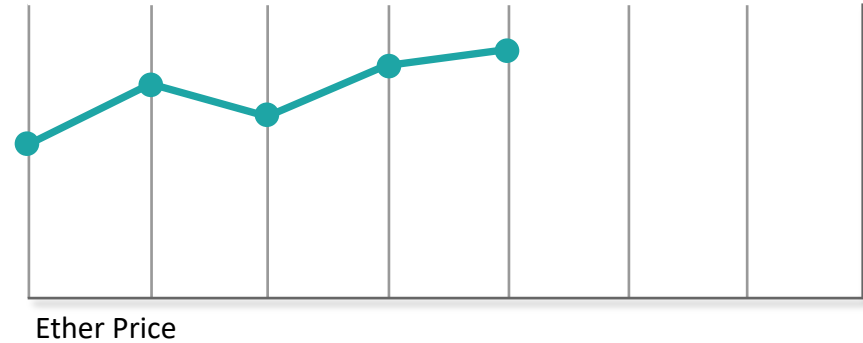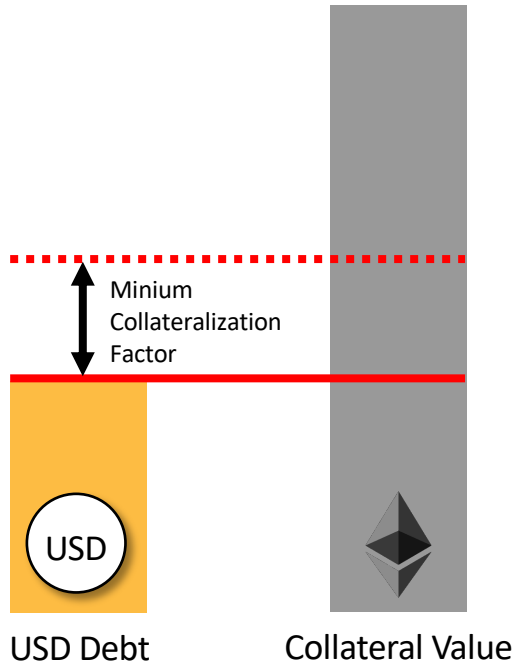
Ether Price
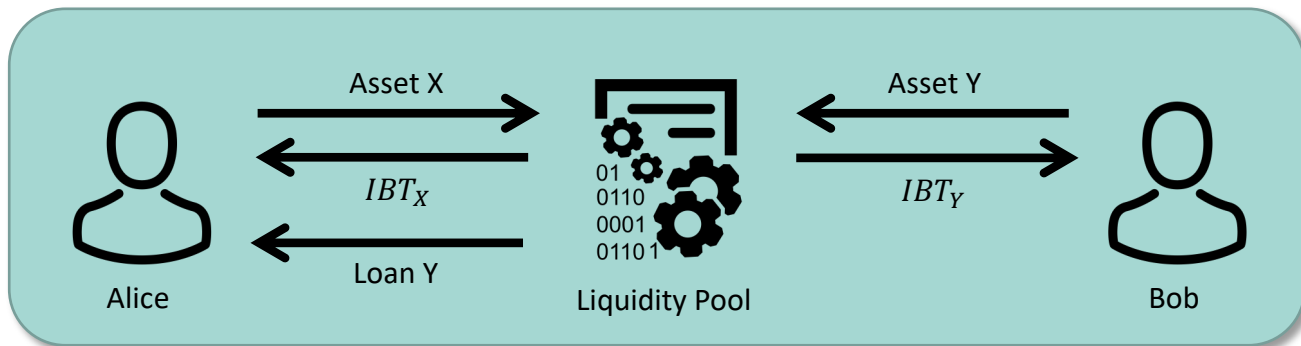
On-Chain Collateralized Stablecoins
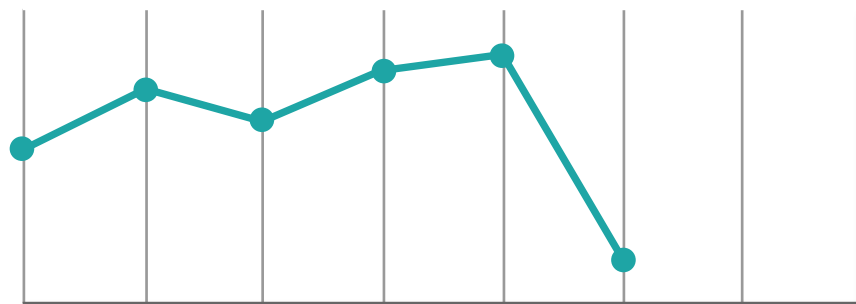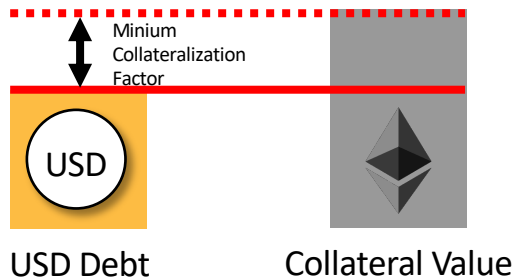
Ether Price

Undercollateralized: Liquidation!
- Collateral is auctioned off for DAI to pay back outstanding debt in DAI.
- Auction stops when minimum collateralization factor is reached.

USD Debt · Collateral Value · Minium Collateralization Factor · USD

Liquidity Pools (CDM)

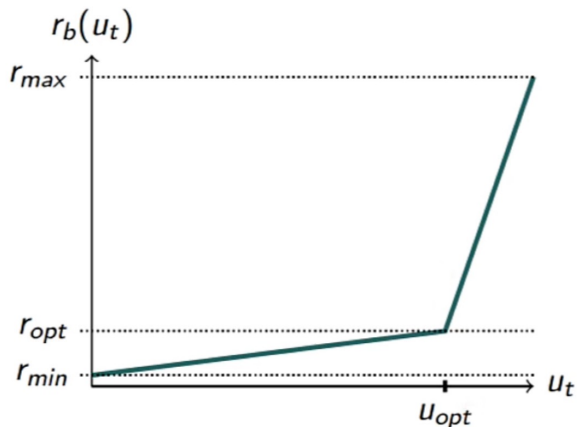# Lending Pools CDM

Interest Rates in Liquidity Pools

How interest rates are determined:
- Interest rate depends on utilization
- Usually defined as two slope case function, where a pre-defined "optimal utilization" ratio is used to determine the case.

More formal and in greater detail:
→ cryptolectures.teachable.com → Smart Contracts and DeFi → DeFi Lending Protocols

Flash Loans

Secured and Unsecured Loans

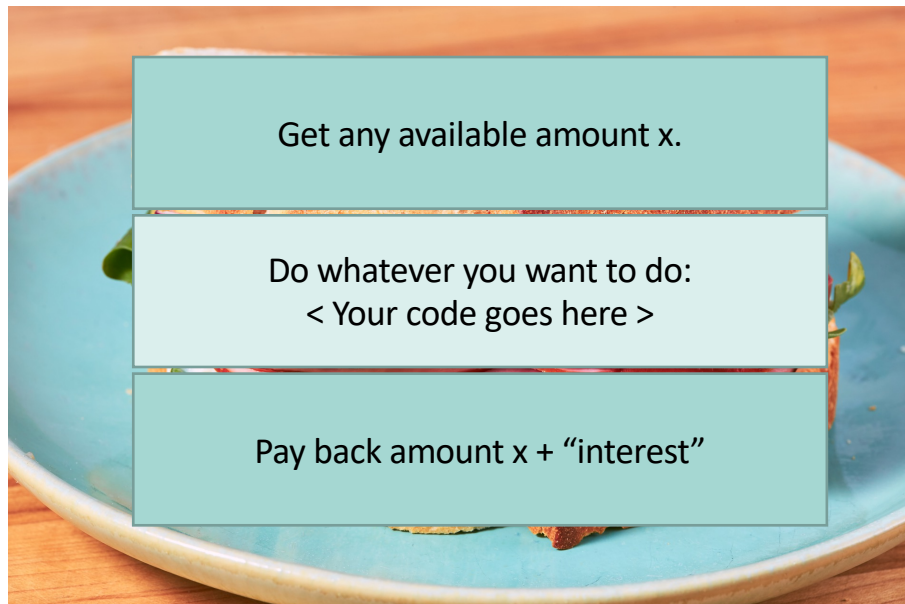A loan usually requires collateral (secured) or a trusted counterparty (unsecured).

Flash Loans are loans that do not require any collateral or established trust relationship.

Let me propose an alternative name:
"Conditional Sandwich Loans"

Flash Loans

Transaction
- Get any available amount x.
- Do whatever you want to do:
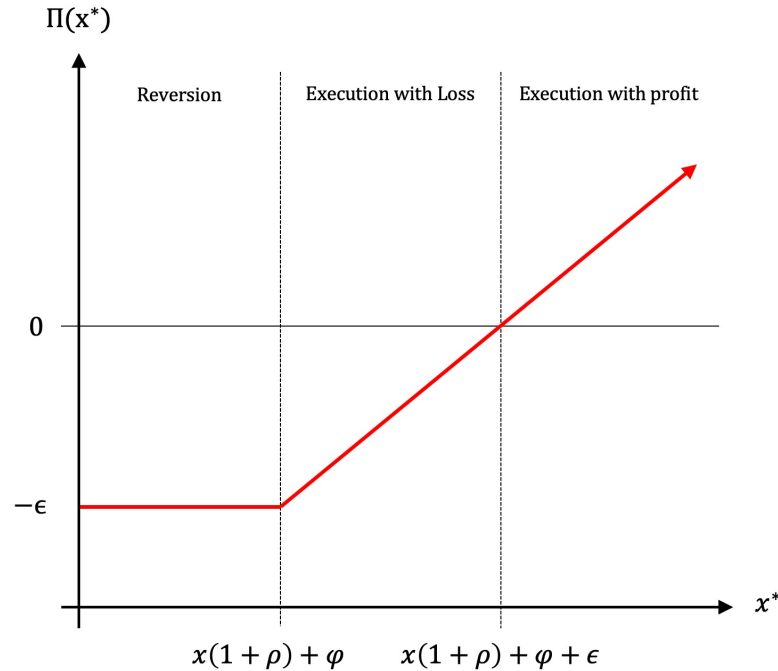 < Your code goes here >
- Pay back amount x + "interest"

Two key principles:
- Atomicity, i.e. no partial execution.
- If the final step fails, everything fails.

Two funding sources:
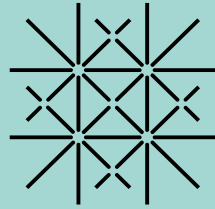- Pooled liquidity
- Flash Minting

Flash Loans – Payoff Structure

Source: Schär et al. (2021) Blockchain in Service Management and Service Research – Developing a Research Agenda and Managerial Implications (Flash Loans). Journal of Service Management Research 5(2):71-102

Some Resources

- Fabian Schär, "**Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets**," Federal Reserve Bank of St. Louis *Review*, Second Quarter 2021, pp. 153-74. https://doi.org/10.20955/r.103.153-74

- Matthias Nadler and Fabian Schär, "**Decentralized Finance, Centralized Ownership? An Iterative Mapping Process to Measure Protocol Token Distribution**," forthcoming: Journal of Blockchain Research. https://arxiv.org/abs/2012.09306

- Fabian Schär and Aleksander Berentsen, "**Bitcoin, Blockchain and Cryptoassets**" 2020, The MIT Press. https://mitpress.mit.edu/books/bitcoin-blockchain-and-cryptoassets

- https://cryptolectures.teachable.com

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